CLAIMS:

1) A fuel system for supplying a plurality of fuels boiling in the gasoline range for use in a spark ignition, internal combustion engine comprising a fuel supply, a membrane in operable communication with the fuel supply for separating said fuel supply into at least a first fuel, said first fuel having a RON greater than about 98 and an aromatics content greater than about 45 vol% and a second fuel.

2) The fuel system of claim 1 wherein said second fuel has a burn rate greater than isooctane, an aromatics content of less than about 45%, and a RON less than about one RON below the supply fuel.

3) The fuel system of claim 2, further characterized as having means for supplying the second fuel to the engine at low load conditions and means for supplying the first fuel to the engine at other than low load conditions.

4) The fuel system of claim 3 wherein said membrane is diepoxide crosslinked/esterified polyimide-aliphatic polyester copolymers or uncrosslinked copolymers, or cellulosic materials, selected from the group consising of polyimide/polyadipate/ polyimide/polysuccinate, polyimide/polymalonate, polyimide/polyoxalate and polyimide/polyglutarate, cellulose tri-acetate, poly(vinyl pyrrolidone), poly(2,6,-dimethyl-1,4,-phenylene ether), poly(alkylene terephthalates), poly(aryl ether ketone amide)s, poly(aryl ether ketone)s, poly (aryl ether sulfone)s, poly (aryl ether)s, poly(ether ester ketone), poly(ether imide), poly(phenylene sulfide), poly(ester)s, poly(amide)s, poly(imide)s, polyarylates, polymethylacrylates, polyolefins, polycarbonates, polycycloolefins, polyester-based thermoplastic elastomers, polyethers, polyacrylonitrile and acrylonitrile copolymers, polystyrene and styrene

copolymers, thermoplastic elastomers, polyester block copolymers, polyamide block copolymers, polyimide block copolymers, polyurethanes and polyurethane block copolymers, thermoplastic polyolefins, thermoplastic vulcanizates, polybenzimidazole, polyketones, ionomers and composites thereof.

5) The fuel system of claim 4 wherein the membrane is supported.

6) The fuel system of claim 4 wherein the separating of the supply fuel into a first and second fuel is characterized by the equation:

$$\frac{\text{First Fuel Aromatic Content}}{\text{First Fuel Non-Aromatic Content}} = \text{ASF} \times \frac{\text{Supply Fuel Aromatic Content}}{\text{Supply Fuel Non-Aromatic Content}}$$

where ASF ranges from about 1.2 to about 8.5.

7) The fuel system of claim 1 wherein said second fuel contains less than about 80% of the aromatics of the supply fuel.

8) The fuel system of claim 6 wherein said first fuel contains greater than about 55 vol% aromatics.

9) The fuel system of claim 1 wherein said first fuel has a burn rate greater than iso octane.

10) The fuel system of claim 1 further including means for admixing the first and second fuel to obtain a third fuel having a RON and aromatics content between that of the first and second fuel, and means of supplying the third fuel to the engines.

11) A method for operating a vehicle having a spark ignition engine to increase the efficiency and reduce the emissions of the engine under conditions of use comprising:

supplying a fuel to a fuel separation means;

separating said fuel into a least first and second fuel;

supplying at least a first fuel to the engine at about high engine load conditions; and

supplying at least a second fuel to the engine at about low engine load conditions,

the first fuel having a RON greater than 98;

the second fuel having a RON less than about one RON below the supply fuel,

and

whereby engine efficiency is increased and emissions are reduced.